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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/697,124	10/31/2003	Yoshiyuki Fukumoto	Q78162	8462

23373 7590 10/17/2006  
SUGHRUE MION, PLLC  
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WASHINGTON, DC 20037

EXAMINER

EVANS, JEFFERSON A

ART UNIT	PAPER NUMBER
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2627

DATE MAILED: 10/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/697,124	<b>Applicant(s)</b> FUKUMOTO ET AL.	
	<b>Examiner</b> Jefferson A. Evans	<b>Art Unit</b> 2627	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 07 August 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-10 and 12-50 is/are pending in the application.  
     4a) Of the above claim(s) 15-50 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 and 12-14 is/are rejected.
- 7) ☒ Claim(s) 1-10 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

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Claims 1-10 and 12-50 are pending.

***Election/Restrictions***

1. The Examiner agrees to examine claims 1 to 14 for the present action. However, it is noted that since it was applicant's error that led to fewer claims being examined in the previous action, the present action will be eligible to be made Final. Claims 15 to 50 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Invention and/or Species, there being no allowable generic or linking claim. Election was made **without** traverse.

***Claim Objections***

2. Claims 1 to 10 are objected to because of the following informalities: claim 1 – lines 10 and 11, "oxynitride of element having" is awkward as it appears "element" should be changed to -- elements -- or -- one or more elements --.

***Claim Rejections - 35 USC § 112***

3. Claims 3, 5, 6, 9, and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 3 is a dependent claim but does not set forth from which claim it depends. Claim 3 sets forth that the diffusion barrier structure has a function of preventing a material from said magnetoresistance element from diffusing into the magnetoresistance element, however the diffusion barrier structure has only been positively

Claims 1 to 50 are pending.

***Election/Restrictions***

1. The Examiner agrees to examine claims 1 to 14 for the present action. However, it is noted that since it was applicant's error that led to fewer claims being examined in the previous action, the present action will be eligible to be made Final. Claims 15 to 50 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Invention and/or Species, there being no allowable generic or linking claim. Election was made **without** traverse.

***Claim Objections***

2. Claims 1 to 10 are objected to because of the following informalities:  
claim 1 – lines 10 and 11, “oxynitride of element having” is awkward as it appears “element” should be changed to -- elements -- or -- one or more elements --.

***Claim Rejections - 35 USC § 112***

3. Claims 3, 5, 6, 9, and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 3 is a dependent claim but does not set forth from which claim it depends. Claim 3 sets forth that the diffusion barrier structure has a function of preventing a material from said magnetoresistance element from diffusing into the magnetoresistance element, however the diffusion barrier structure has only been positively

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established as being present between the conductor and the magnetoresistance element and it is not seen as to how this can enable it from preventing a material from said magnetoresistance element from diffusing into the magnetoresistance element. Claims 5 and 6 appear to broaden or contradict the claim from which it depends in that claim 1 as amended sets forth that the diffusion barrier structure is made of oxynitride whereas claim 5 sets forth that the diffusion barrier layer may be oxide, nitride, or oxynitride and claim 6 sets forth that the diffusion barrier layer is [conductive] nitride. Claims 9 and 10 similarly limit the diffusion layer to being oxide or nitride of element respectively, whereas claim 1 limits the diffusion barrier layer to being oxynitride.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-7, 9, 10 are rejected under 35 U.S.C. 102(e) as being anticipated by Slaughter et al (U.S. 6,544,801). Slaughter discloses a magnetoresistive tunnel junction device including a diffusion barrier structure 67 of  $\text{AlO}_x$  or  $\text{TaN}_x$  having a thickness as low as 10 Angstroms (1.0 nanometer) and positioned

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between a conductor 68 and a free layer 66. The limitation of claim 1 concerning free energies will be inherently met by the Slaughter reference. Applicant argues that Slaughter does not disclose the material of his top electrode. The Examiner disagrees and notes that Slaughter establishes that his top electrode will be formed from aluminum or copper (column 4 – lines 44 to 46). Tunnel barrier layer 64 may be as thin as 7 Angstroms (0.7 nanometers) and the diffusion barrier layer 67 may be even thinner, going down to 5 Angstroms (column 6 – lines 13 and 14).

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Slaughter et al. Slaughter discloses diffusion barrier structure thickness down to 5 Angstroms but does not expressly disclose diffusion barrier structure thickness below 5 Angstroms.

It would have been obvious to have the thickness of the diffusion barrier structure of Slaughter be less than 5 Angstroms. The motivation would have been: the express disclosure of a range of values is also suggestive of immediately adjacent values. In this case, the express disclosure by slaughter of

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values down to 5 Angstroms would also be suggestive of values, such as 4.9 Angstroms, immediately below the lowest expressly disclosed value.

8. Claims 12 to 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Slaughter et al in view of Sasaki et al (U.S. 5,998,016). Slaughter discloses  $\text{AlO}_x$  or  $\text{TaN}_x$  for forming his diffusion barrier layer does not expressly disclose his diffusion barrier layer as being a material such as  $\text{SiO}_2$  or  $\text{SiN}$ .

Sasaki discloses that oxides and nitrides such as  $\text{Al}_2\text{O}_3$ ,  $\text{SiO}_2$ , and  $\text{SiN}$ .

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the diffusion barrier layer of Slaughter from  $\text{SiO}_2$  or  $\text{SiN}$ . The motivation would have been: as evidenced by Sasaki, it was known in the magnetoresistive head art that both oxides and nitrides were advantageous for forming a diffusion barrier layer, and more specifically that  $\text{SiO}_2$  or  $\text{SiN}$  were recognized alternatives to a material such as  $\text{Al}_2\text{O}_3$ .

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be

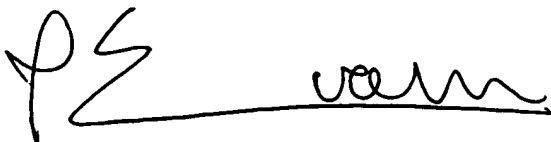
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calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jefferson A. Evans whose telephone number is 571-272-7574. The examiner can normally be reached on Monday to Friday, 9:00am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa Thi Nguyen can be reached on 571-272-7579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

A handwritten signature in black ink, appearing to read 'JAE' followed by a stylized, wavy line.

JAE

October 13, 2006

Jefferson A. Evans  
Primary Examiner  
Art Unit 2627

**JEFFERSON EVANS  
PRIMARY EXAMINER**